

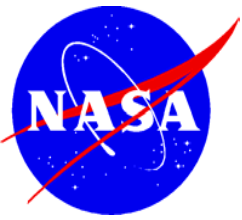
Johnson Space Center

Return to Flight Status of Overflight Risk to Public During Entry

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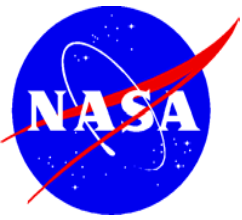


Entry Over-Flight Risk Plan Being Developed



- **SSP Return To Flight Action #5**: The Space Shuttle Program will provide population overflight comparisons, and evaluate relative risk for:
 - all entry ground tracks (crossranges)
 - each operational inclination
 - each of the three Continental United States (CONUS) primary landing sites.
- **CAIB Observation 10.1-2** – NASA should develop and implement a plan to mitigate the risk that Shuttle flights pose to the general public.

The purpose of this briefing is to provide the current status of this effort.

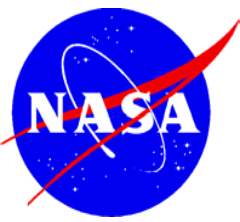


Safety Is Primary Concern



The Shuttle Program would not knowingly expose the public, nor the crew to any potentially catastrophic/risky environment

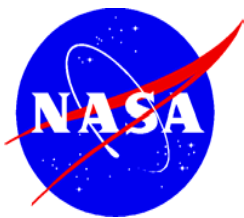
...maintaining a healthy crew and vehicle integrity is the most powerful way to ensure public safety!



Risk Management Strategy



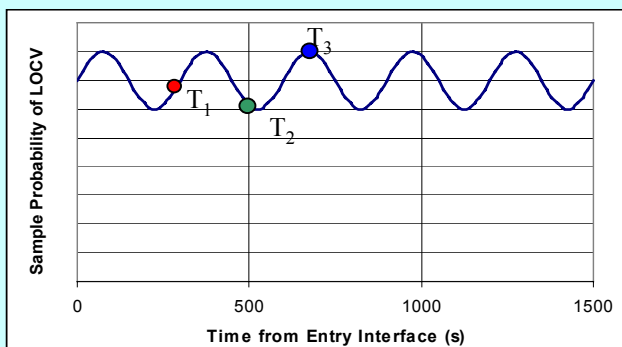
- The current Space Shuttle Program strategy –
 - **Develop pre-flight and real time capabilities**
 - **to measure relative public risk between each landing opportunity**
 - **and to implement mitigation options through pre-defined mission rules.**
- Mission rules will define real time risk mitigation priorities.
 - Ground track selection will always be a trade between vehicle risks factors, such as landing site weather versus ground risks from catastrophic failures.
 - The greatest protection against overflight risks is an un-breached, healthy Orbiter, healthy crew, and good weather at the landing site.



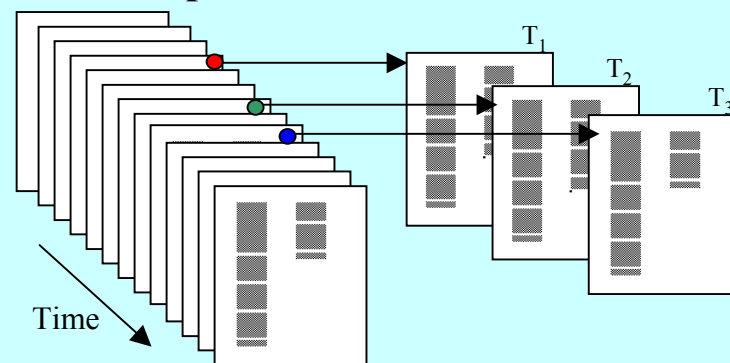
Primary Risk Assessment Contributors



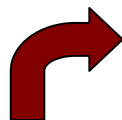
Probability of LOC Failures



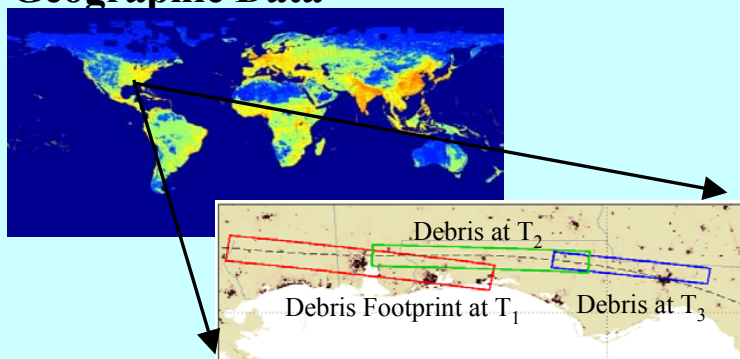
Breakup Debris Models



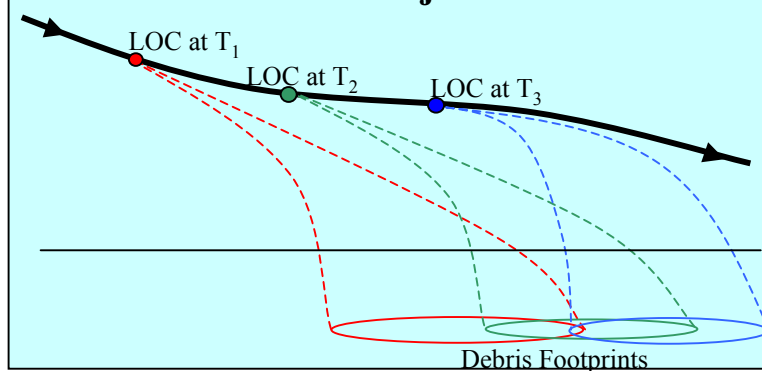
Public Relative Risk

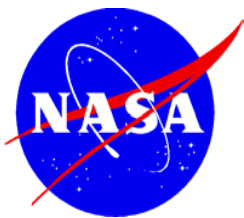


Geographic Data

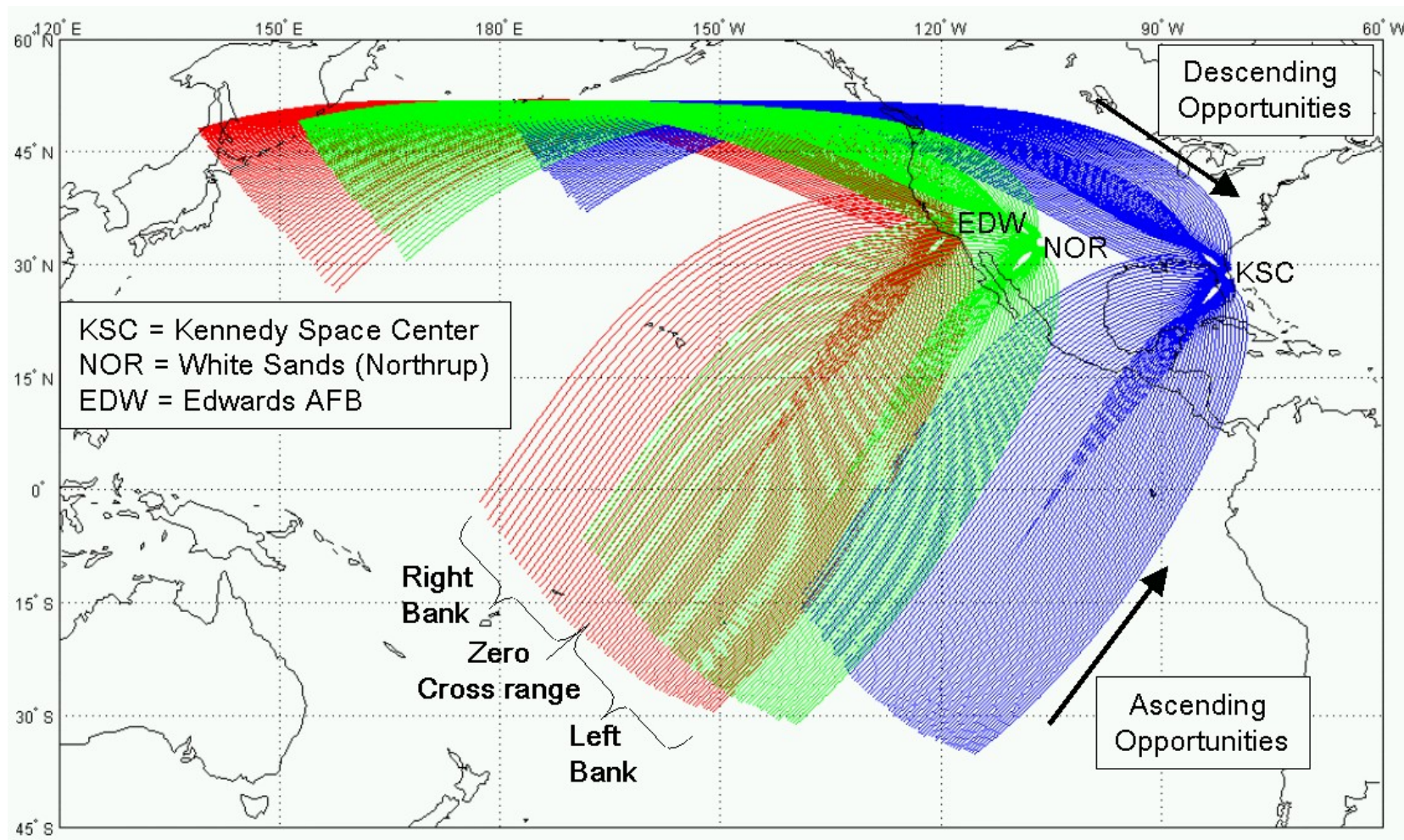


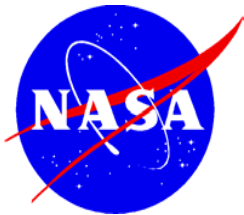
Vehicle & Debris Trajectories





All Possible Entry Ground Tracks (51.6 degree inclination)

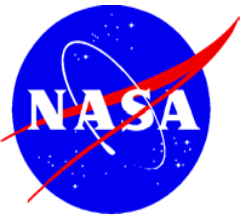




Limited Daily Landing Opportunities



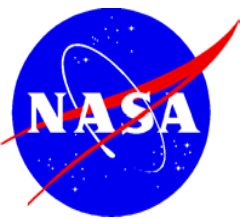
- Launch time and orbital mechanics determines which deorbit and entry options exist each day
- Each mission day has from two to three landing opportunities per site
- Only minor adjustments are feasible to the entry approach ground tracks for a given orbit and landing site



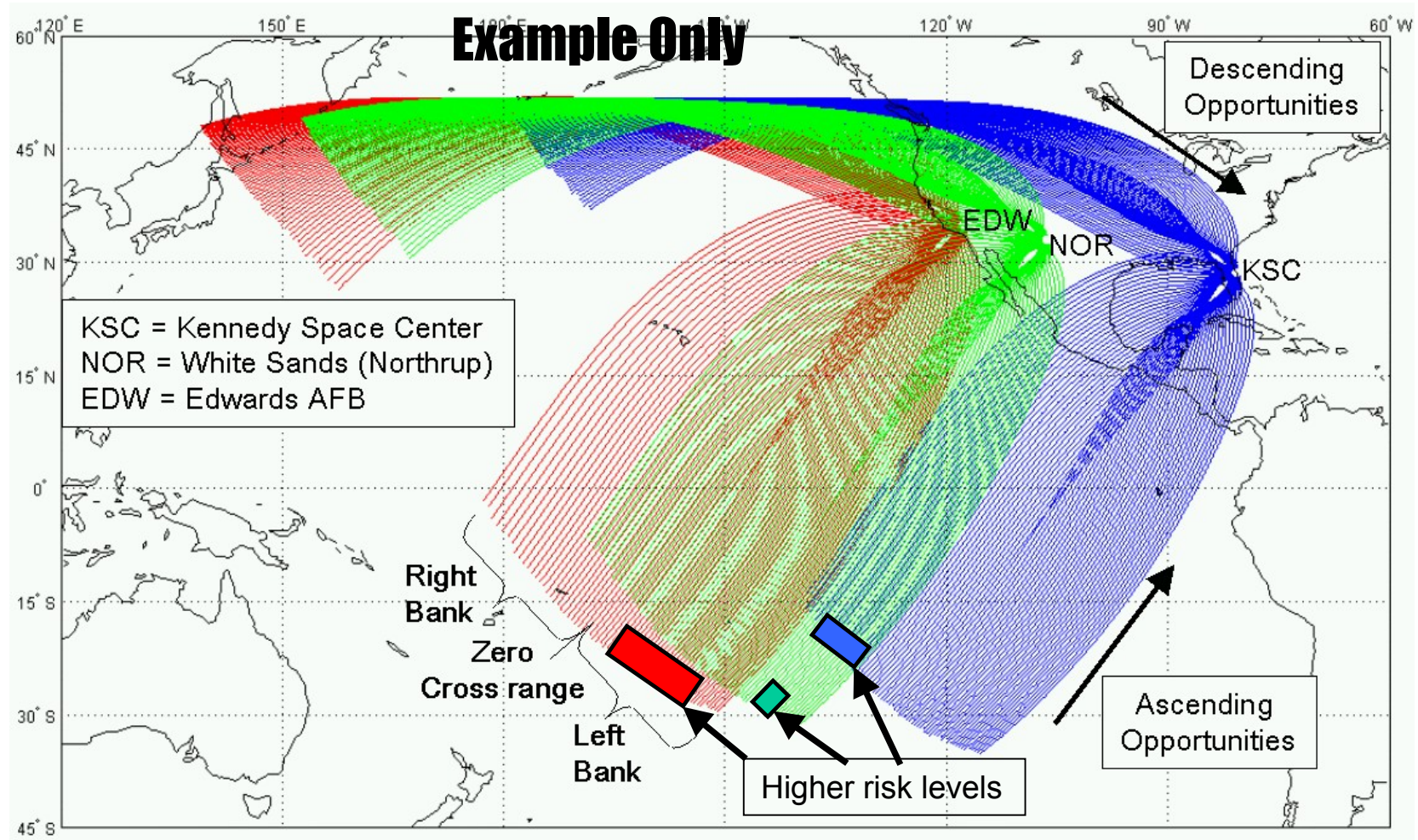
Sample Daily Entry Opportunities

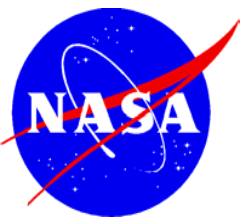


- *Insert video*



Preliminary Results – restrict many entry opportunities





Summary



- NASA is aggressively building a Shuttle entry risk model and defining constraints which will mitigate public risk exposure from re-entry
- The Space Shuttle Program strategy to support return-to-flight includes:
 - development of mission rules defining when landing opportunities may be restricted for public risk mitigation,
 - assessing the validity of a relative risk approach and determining the need for higher-fidelity models,
 - computing relative public risk levels between landing opportunities to the primary CONUS sites (by return-to-flight).